Instructions for Retrofit Kit AK-2A-25

Retrofit Kit Styles 8186A52G04 8186A52G05 8186A52G06

GENERAL INFORMATION

The retrofit kit which you have received contains all the necessary parts to convert your AK breaker from a device using an electro-mechanical tripping system to one which will have solid state tripping. To understand the transition, one should be acquainted with the basic components and their functions.

The circuit breaker is tripped on fault conditions by combined operation of three components:

(a) Sensors – Quantity of Three
(b) Amptector – Solid-State Trip Unit – Quantity of One
(c) Actuator – Quantity of One

Schematically this can be shown in Figs. 1 and 3. This makes a very flexible system covering a wide range of tripping characteristics, due to the adjustable amptector and the range of sensors available. All necessary tripping energy is derived from the load current flowing through the sensors, no separate power source is required. The tripping characteristics for a specific breaker rating, as established by the sensor rating, are determined by the continuously variable settings of the Amptector static trip unit. This unit supplies a pulse of tripping current to the actuator which trips the breaker.

SENSORS

The sensors produce an output proportional to the load current, so the breaker continuous current rating within the frame size can be changed simply by changing the tap setting or the sensors. Proper polarities must be maintained.

It is the sensor rating (or tap) that determines the actual current for one (1) per unit current on the amptector.

All sensors are mounted on the rear upper studs on the back of the breaker base.

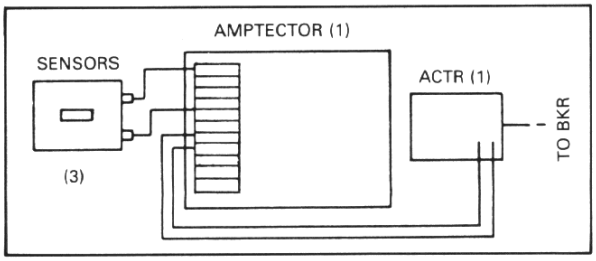


Fig. 1 *Schematic of Solid State Tripping*

WARNING

High voltages are present in a circuit breaker and associated accessories. Before working on a circuit breaker or accessories installed in an electrical system, make sure the circuit breaker is OPEN and there is no voltage present where work is to be performed. The voltages in energized equipment can cause serious injury or death.

Before closing a circuit breaker, make sure that no work is being carried out by personnel on equipment serviced by the circuit breaker. The voltages from energized circuit breakers can cause serious injury or death.

AMPTECTOR

The Westinghouse Amptector IA is a solid state device that provides adjustable overcurrent tripping for the retrofitted AK breaker. Only one amptector is required per breaker; it receives all of its energy from a set of sensors – one mounted on each pole of the breaker. It develops an output for its associated trip actuator when preselected conditions of current magnitude and duration are exceeded.

The Amptector IA for retrofit is supplied with three models of combination of four (4) independent continuously adjustable overcurrent tripping functions:

Long Delay (L)
Short Delay (S)
Instantaneous (I)
Ground (G)

The following combinations of the amptector are available:

LIG Long Delay and Instantaneous
LSG Long Delay and Short Delay
LSIG Long Delay, Short Delay and Instantaneous

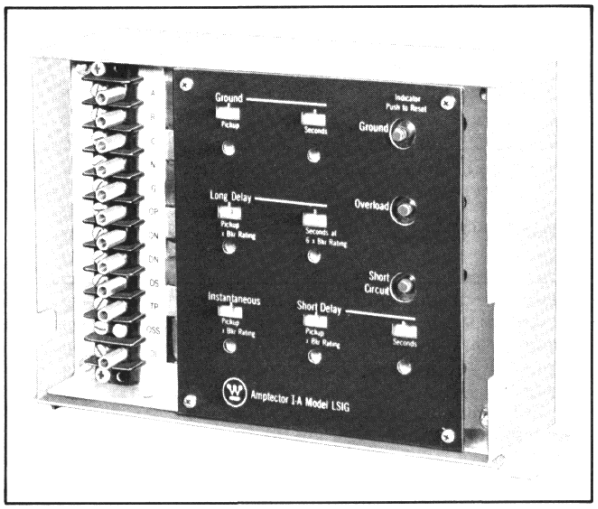


Fig. 2 *Amptector IA*

ADJUSTMENTS

There are a maximum of seven (7) adjustable controls on the Amptector IA, each can be adjusted with a screwdriver through openings in the front face plate, Fig. 2.

1. Long delay current pickup
2. Long delay time
3. Short delay current pickup
4. Short delay time
5. Instantaneous current pickup
6. Ground current pickup
7. Ground delay time

NOTE: The term "pickup" as used here means the magnitude of current at which the amptector timing function begins.

ACTUATOR

When the actuator receives a tripping pulse from the Amptector, it releases a mechanical force to trip the breaker. The actuator is made up of a permanent magnet and a spring (see Fig. 3). When the breaker is open, the cross bar pushes the reset lever. The reset lever moves the plunger out, and the plunger then compresses the spring and pulls the keeper until it contacts the pole pieces of the magnet. Although the magnet cannot pull and reset the keeper against the force of the spring acting on the plunger, it can hold the spring force when the keeper is in contact with the magnet. A current pulse from the Amptector counteracts the effects of the permanent magnet allowing the spring to separate the keeper from the magnet and move the plunger to actuate the trip lever.

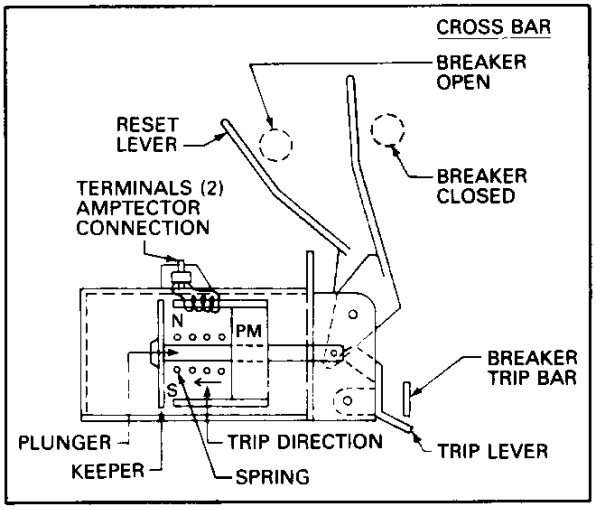


Fig. 3 *Actuator Diagram*

GROUND PROTECTION

All the Amptectors IA in retrofit kits are supplied with a ground element. The ground fault protection is provided by energizing this element with the residual of the currents (from the three properly polarized phase sensors in a 3-phase 3-wire system, or from the three phase sensors plus a neutral sensor in a 3-phase 4-wire system, or from a separate ground current sensor.) The Amptector IA can also be wired so that there is no ground fault protection (see Fig. 9).

The ground pick-up values as shown in Table A are the required currents to initiate the pick-up of the ground element and must be the actual current into the "G" terminal of the Amptector. It must be noted that when testing the Amptector for ground pick-up, the sensors may need to be disconnected in order to obtain the results in the table, otherwise higher currents may be required due to the exciting current lost to the sensors. The secondary test current is injected into a phase terminal say "A" and back out of "G".

Table A — Ground Pick-up Values — Amperes (All Pick-up Values May Vary ± 10%)

Dial Settings	Secondary Current
A	1.0
B	1.5
C	1.9
D	3.0

SERVICING OF THE AMPTECTOR

The Amptector is the intelligence of the overcurrent protection provided by the breaker. This device is made up of many solid state components; the only moving parts are for the adjustments. All internal components and connections, including the printed circuit board, are coated to give effective environmental protection. The Amptector is not field serviceable and should give long trouble-free service.

Each Amptector includes terminal receptacles to permit easy field checking of operation and calibration with an external current source. A specially designed portable test device with a plug to match the Amptector receptacle is available and recommended to provide the utmost in simplicity for checking amptector operation. The tester can be plugged into any 120V, 60 HZ outlet and can provide enough current to check any pick-up calibration. Accurate values for short time pick-up can be checked, to verify proper operation.

If there is any reason to suspect that the Amptector is not operating correctly, it should not be tampered with; since tampering could result in loss of vital overcurrent protection.

If the Amptector is not operating correctly a spare Amptector should be substituted and the questionable unit returned to the factory for service. Amptectors are not field repairable.

MAKING CURRENT RELEASE (DISCRIMINATOR)

All Amptector trip units which do not have instantaneous trip elements (Amptector IA models LS and LSG) are provided with a "making current release" which is referred to as a "Discriminator". This is a circuit in the trip unit which determines at the time of a fault whether or not there has been any current flow in the primary circuit previous to the fault. If there has been no measurable current flow previous to the fault, indicating that the circuit breaker is just being closed (or possibly that a switching device ahead of the breaker has just been closed) and if the primary current flow exceeds approximately twelve times the sensor rating, the trip unit will function instantaneously. If the "Discriminator" circuit determines that there has been a measurable current flow prior to the fault, the instantaneous operation will not occur and the normal short time delay element will take over to delay tripping. The purpose of this unique tripping concept is that selectivity and continuity of service in un-faulted sections of the system can be maintained if there is any need, but if there is no previously operating load on the circuit, the instantaneous function takes over to limit extensive damage which might occur due to a delayed tripping operation.

REQUIREMENTS

Before proceeding with the conversion the following should be noted.

1. Items on hand:

   Ratchet (⅜") socket set with ½", 7/16" sockets straight edge, scriber, center punch, file, screwdriver, hammer.

   Electric drill, ⅛", ¾", twist drills, for ¼-20 taps, 10-32 taps, tap holder, pliers.

   9 or 12 volt dry cell battery.

   Test apparatus, such as Amptector Tester Style No. 140D481G02 or Multiamp tester.

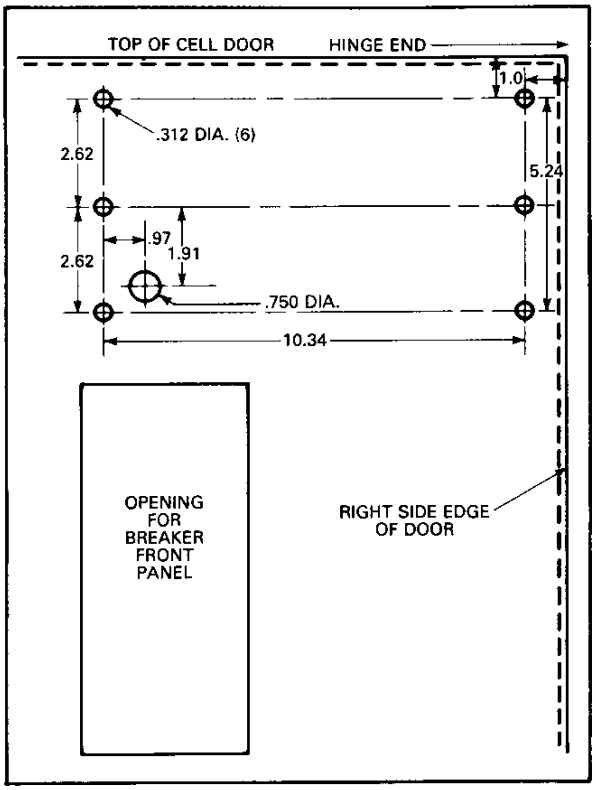


Fig. 7 *Amptector Mounting Details Horizontal Mount AK-2A-25 Front View of Cell Door*

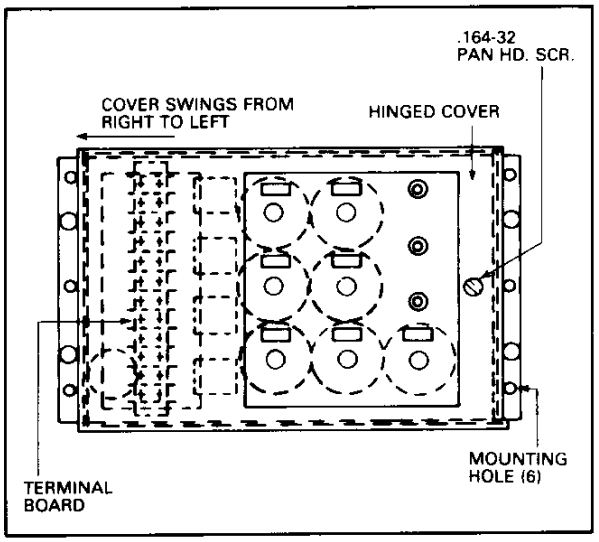


Fig. 8 *Amptector in Horizontal Position*

MOUNTING OF THE HARNESS AND SENSORS

1. Acquaint yourself with the wiring scheme, Fig. 9.

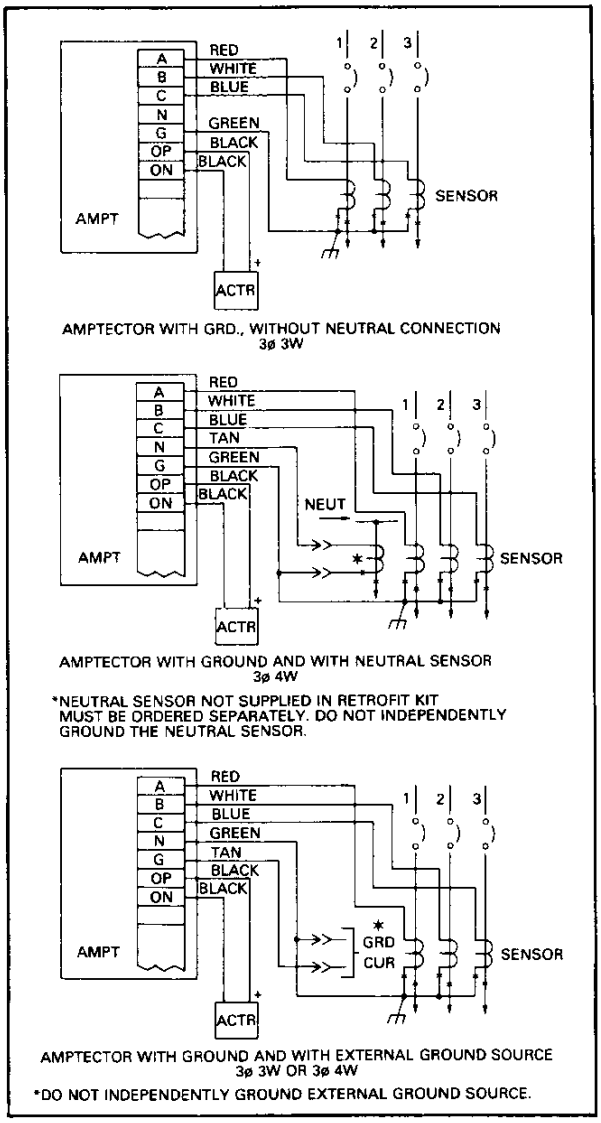


Fig. 9

2. Check each lug on the harness to ensure they are properly secured to the wires.
3. Thread the sensor end of the harness through the opening between the frame and the support panel on the right hand side of the breaker.

   If there is difficulty in getting the harness through the opening, remove approximately 18 inches of the harness cover.

2. Check items received against bill of material as listed for each type of breaker and for proper style numbered kit.

3. Operate the actuator a few times. Alternately pull back on the reset lever (see Fig. 3) and then trip by applying 9 to 12 volts D-C (be sure to use correct polarity) to the terminals.

   NOTE: Arm must be manually reset after each operation.

4. Review the procedure for each type of breaker involved and the sensor tap connections for the various current ratings.

5. Review the photographs, drawings and wiring diagrams to acquaint yourself with the items and location.

6. Arc chutes need not be removed and breaker should be worked on in the upright position.

RETROFIT KIT

All retrofit kits are style numbered and contain the parts necessary to fulfill your requirements, therefore check to see that you have received the styles as ordered. Remove items from box and check against bill of material for appropriate parts.

AK-2A-25 RETROFIT KIT BILL OF MATERIAL

Quantity per Breaker	Description	Style Number
1	Amptector LIG	693C364G01
or 1	Amptector LSG	693C364G02
or 1	Amptector LSIG	693C364G03
1	Actuator	693C365G01
3	Sensors (Multi-current) (200-400-600 Amperes)	8257A65H01
1	Wiring Harness	6502C14G01
3	Copper "Z" Jumpers	8209A64H01
1	Hardware Kit	8186A53G05

*Note: Kits contain more hardware than required due to multi-purpose use, check all figures for number and size of hardware.

PROCEDURE

After you have read the requirements and you are familiar with all details, proceed in the following manner:

1. Remove the three (3) electro-mechanical trip units.

2. Place the 2.0" x 2.38" x .25" "Z" copper connector over top of the upper stationary and lower stationary terminals, lining up the holes. Secure connector using .375-16 x 1.0 hex bolt, washer and lockwasher. See Fig. 4.

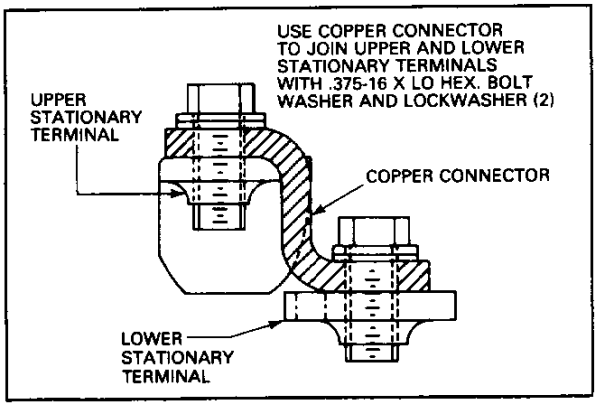


Fig. 4 *Connecting Upper and Lower Stationary Terminals*

PLACEMENT OF ACTUATOR

If the breaker is electrically operated:

Step 1: Remove the two screws holding the control relay, do not remove relay allow it to lie on the platform.

Step 2: Assemble trip paddle on breaker trip bar using .25-20 x .75 carriage bolt, trip bar finger and elastic nut, do not tighten nut. Fig. 5.

Step 3: Position the actuator above the holes that held the control relay, slide the bottom of the reset arm on the .50 shaft on the right side of breaker, and attach the cap type push nut fastener, Fig. 5.

Step 4: Place the insulating material 2" x 3.38" under the terminals of the control relay. Secure with an adhesive, Figs. 5 and 6.

Step 5: Position the ½" x 1⅝" spacer beneath the holes under the actuator. Slide the control relay over so that the holes match those of the spacer. Fasten the actuator, spacer and control relay with the .190-32 x 1.0 fil. hd. scr. and washers, Figs. 5 and 6.

If the breaker is to be manually operated Steps 4 and 5 are not required. Secure actuator to frame with .190-32 x 1.0 fil. hd. scr. washer, lockwasher and nuts, see Fig. 5.

Step 6: Secure the cross brace between the actuator and existing .25-20 x ⅝" phillips head screw located on the top right of the front panel using a .25-20 nut. See Fig. 6.

Step 7: Move the assembled trip paddle to line up directly under the trip adjustment screw on the actuator. Spacing between the trip paddle and trip adjustment screw is approximately ⅛" with breaker in closed position, Fig. 5.

Step 8: Close breaker manually, using a 9 to 12 volt transistor battery, check tripping and reset functions of actuator, repeat numerous times to verify proper functioning. It may be necessary to reset trip adjustment screw for proper setting of the actuator tripping.

MOUNTING THE AMPTECTOR

1. Acquaint yourself with the location of the mounting holes and placement of the amptector, Figs. 7 and 8.

2. Facing the front of the door scribe a horizontal line one (1") inch from the top of the door and parallel to the edge of the door. Scribe a vertical line one (1") inch from the top right side of the door and parallel to the edge. The intersection of these two lines locates the hole for the amptector at the top right side of the door, Fig. 7.

3. From the top horizontal line measure a distance of 5.24 inches down and scribe a parallel line, Fig. 7 and from the vertical line measure a distance of 10.34 inches and scribe a line parallel to the vertical line. This now locates the four (4) outer hole location. Now locate the center line, and the two inner holes, Fig. 7.

4. Using the center line and the left vertical line locate the center of the grommet hole, Fig. 7.

5. Centerpunch all locations, drill six (6) .312 diameter holes and one (1) .750 diameter hole.

6. Place the grommet into the .750 diameter hole. Mount the amptector on the door using .25-20 x 1.0 pan head screw, washer, lockwasher and nut. Finger tighten the nuts on the screws, Fig. 8.

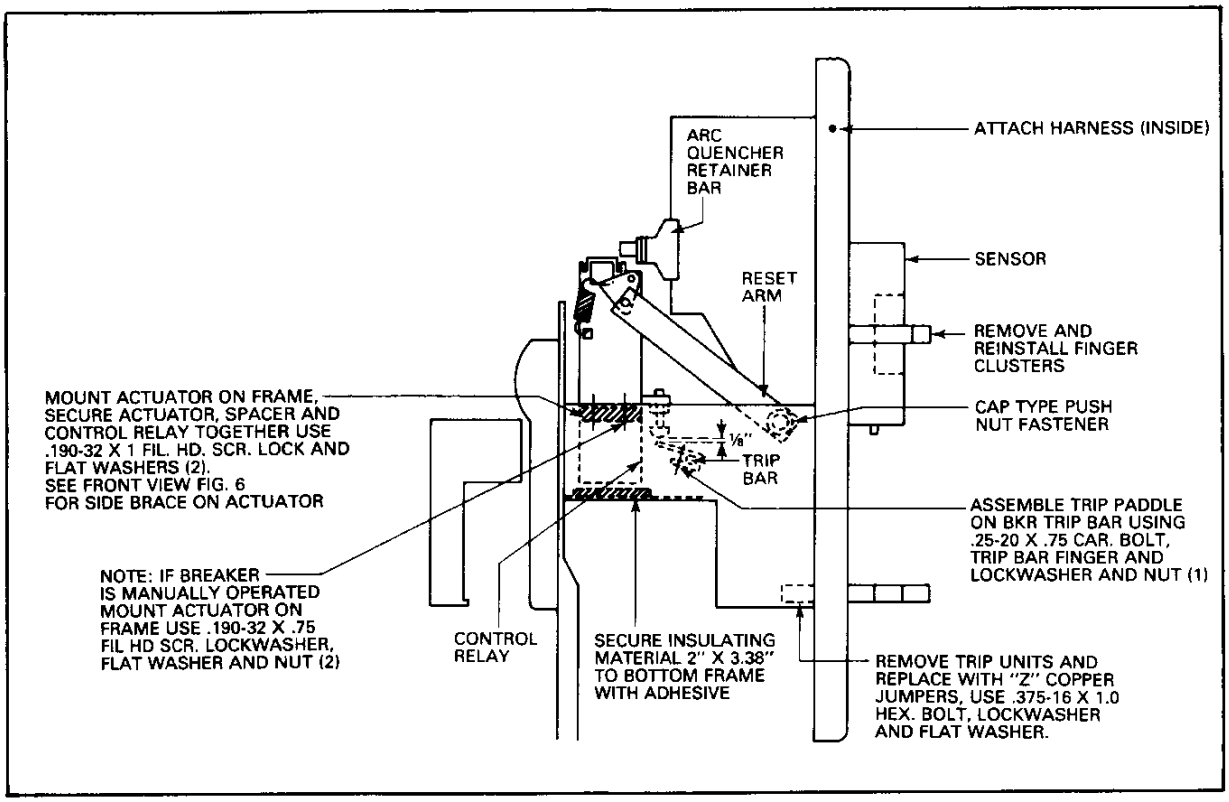

ARC QUENCHER RETAINER BAR
ATTACH HARNESS (INSIDE)
SENSOR
RESET ARM
REMOVE AND REINSTALL FINGER CLUSTERS
CAP TYPE PUSH NUT FASTENER
MOUNT ACTUATOR ON FRAME, SECURE ACTUATOR, SPACER AND CONTROL RELAY TOGETHER USE .190-32 X 1 FIL. HD. SCR. LOCK AND FLAT WASHERS (2). SEE FRONT VIEW FIG. 6 FOR SIDE BRACE ON ACTUATOR
1/8"
TRIP BAR
ASSEMBLE TRIP PADDLE ON BKR TRIP BAR USING .25-20 X .75 CAR. BOLT, TRIP BAR FINGER AND LOCKWASHER AND NUT (1)
NOTE: IF BREAKER IS MANUALLY OPERATED MOUNT ACTUATOR ON FRAME USE .190-32 X .75 FIL HD SCR. LOCKWASHER, FLAT WASHER AND NUT (2)
CONTROL RELAY
SECURE INSULATING MATERIAL 2" X 3.38" TO BOTTOM FRAME WITH ADHESIVE
REMOVE TRIP UNITS AND REPLACE WITH "Z" COPPER JUMPERS, USE .375-16 X 1.0 HEX. BOLT, LOCKWASHER AND FLAT WASHER.

Fig. 5

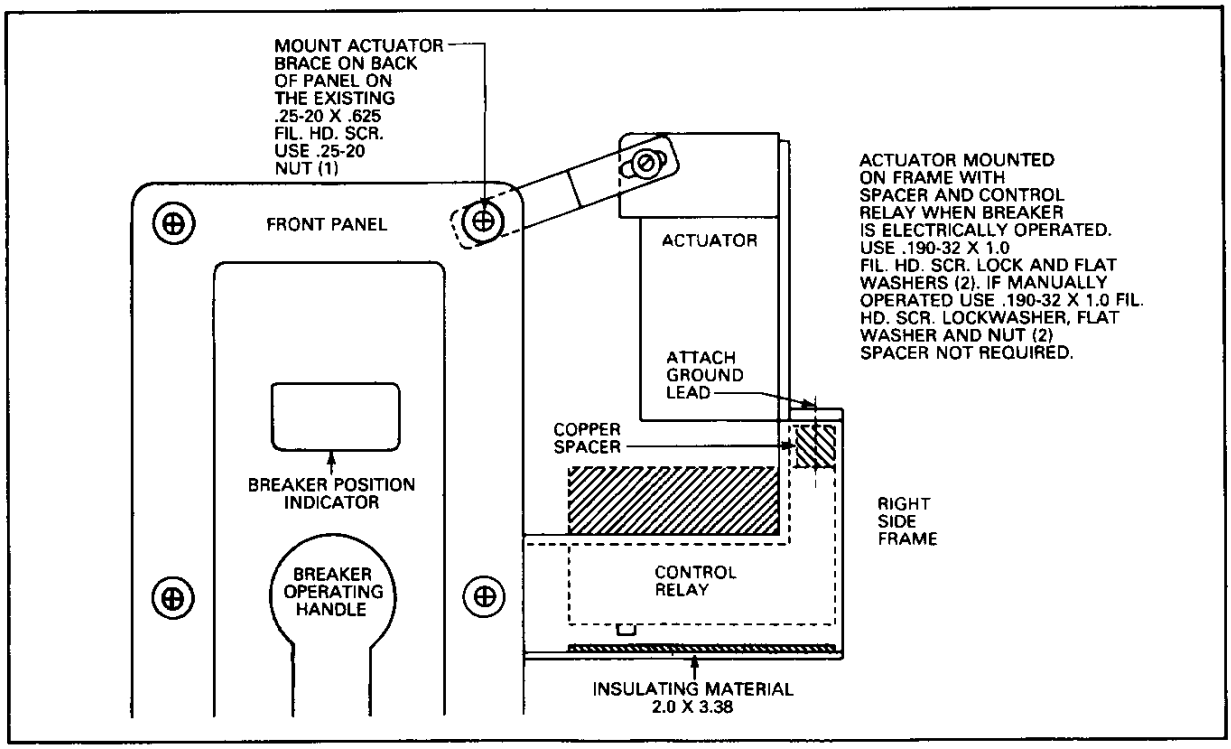
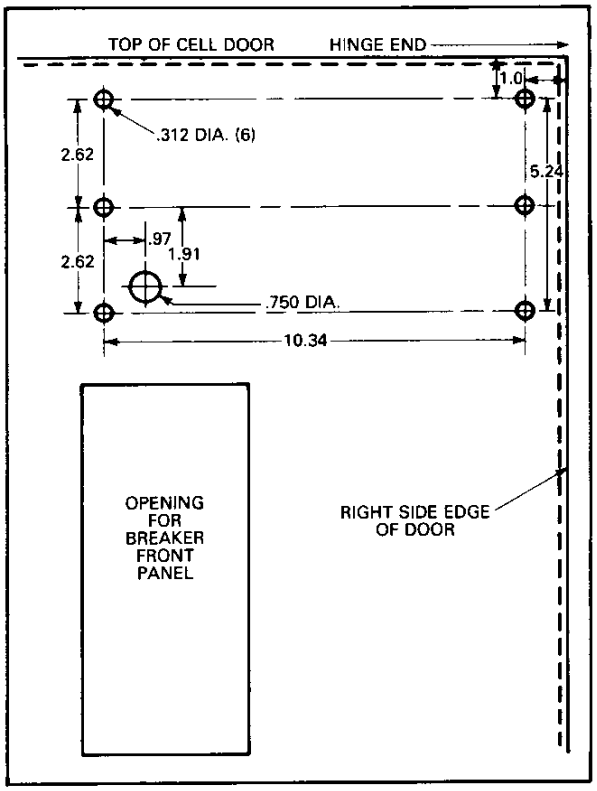

MOUNT ACTUATOR BRACE ON BACK OF PANEL ON THE EXISTING .25-20 X .625 FIL. HD. SCR. USE .25-20 NUT (1)
FRONT PANEL
ACTUATOR
ACTUATOR MOUNTED ON FRAME WITH SPACER AND CONTROL RELAY WHEN BREAKER IS ELECTRICALLY OPERATED. USE .190-32 X 1.0 FIL. HD. SCR. LOCK AND FLAT WASHERS (2). IF MANUALLY OPERATED USE .190-32 X 1.0 FIL. HD. SCR. LOCKWASHER, FLAT WASHER AND NUT (2) SPACER NOT REQUIRED.
ATTACH GROUND LEAD
COPPER SPACER
BREAKER POSITION INDICATOR
BREAKER OPERATING HANDLE
RIGHT SIDE FRAME
CONTROL RELAY
INSULATING MATERIAL 2.0 X 3.38

Fig. 6



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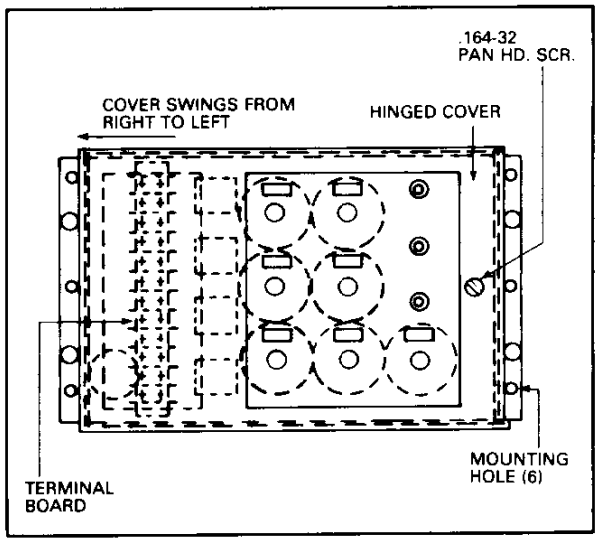

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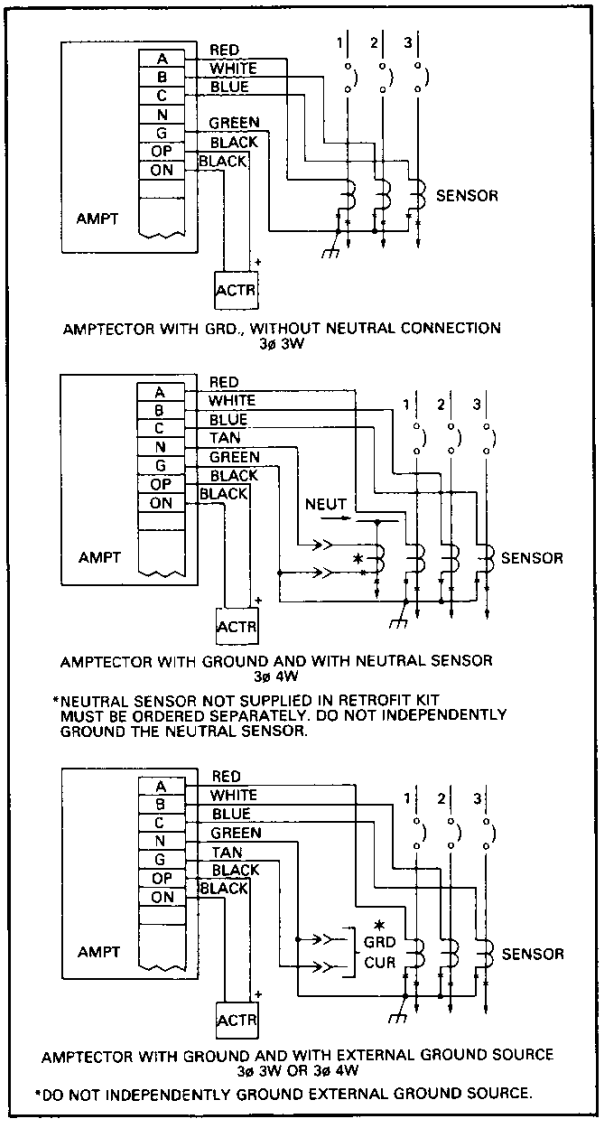

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